placed between the light and the eye under examination the illuminating rays are intercepted.

This difficulty is overcome by using reflected instead of direct light; the observer placing his eye behind and looking through an aperture in the mirror—the reflected rays from which illuminate the eye under examination.

This is the principle upon which the ordinary ophthalmoscope is constructed. We regret that our space will not admit of a further notice of this portion of Dr. Rosebrugh's interesting paper. We reproduce however, entire, the part of the doctor's paper referring to this new instrument.

Construction.

The Tubes.—The instrument consists of two brass tubes (A & B fig. 1) 1½ inches in diameter, being respectively 4 and 2½ inches in length. The longer tube B moves freely in a brass collar fitted to the aperture of a small camera K, and the shorter tube A is turned toward the source of light.

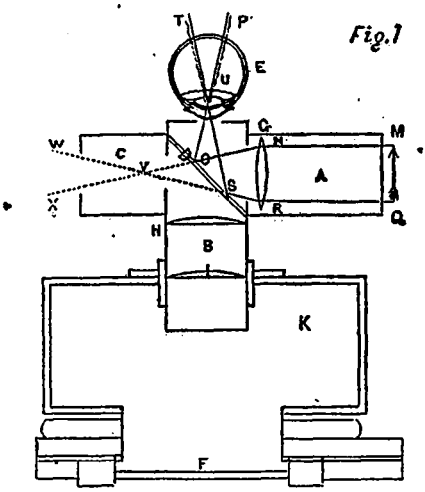

Fig. 1

A tube C of the same width, 1½ inches in length, is joined to the side of the outer extremity of the tube B opposite to and in a line with tube A. The outer extremity of the tube B extends ¼ of an inch beyond its juncture with the tubes A and C, and is terminated by a thin brass diaphragm having a central circular aperture of ⅛ of an inch in diameter.

At the juncture of the tube A with B there is a circular aperture of one inch diameter, and between C and B an aperture of ½ inch diameter, affording a communication between A and C through B.

The Plate Glass.—At the juncture of the tubes, there is placed an elliptical piece of highly polished thin plate glass with parallel surfaces, which is inclined at such an angle to the tubes that a ray of light falling upon it through the centre of the tube A from the direction M Q will be reflected at right angles to its original direction and in the same plane with the centre of the tube B, which will be through the centre of the aperture in the diaphragm. A portion of the ray will be refracted by the plate glass, and pass through the tube C parallel to its original direction.

The Lenses.—At the inner extremity of the illuminating tube A, and as close as possible to its juncture with the camera tube B, a double convex lens G is placed 1¼ inches in diameter, and having a focal distance of 2½ inches. In the corresponding position of the tube B, or close to the plate glass reflector, the lens H is placed, convexo-plane of 5 inch focal distance; 1¾ inches from this is another lens, 1, also convexo-plane, and of 5 inch principal focal distance, and having the same diameter, viz, 1¼ inch.

The Camera.—The camera consists of a mahogany box three inches square and seven inches high, having (to secure steadiness) a base six inches square At the aperture in the centre of the anterior side there is a brass collar fitted, through which slides the tube B containing the lenses. At the opposite side of the camera is a central aperture 2½ inches square, behind which is a slide with a piece of ground glass 2½ inches square. This slide moves in grooves for the purpose, and can be removed to make way for a slide containing a sensitized plate also about 2½ inches square. The whole is contained in a case about 8 inches in height, which serves the double purpose of supporting the instrument when in use, and holding it afterwards.

Photographing.

As yet I have not attempted a photograph of the retina of the human eye, but have confined my experiments to the lower animals, and have employed solar light only in order to shorten the time as much as possible; but I do not doubt that diffused light, particularly that reflected from a bright cloud, would with a longer "exposure" answer very well. In using the instrument for this purpose, a tripod, or what answers quite as well, a table of the ordinary height is placed near a window where the light of the sun will fall upon it.

It is well to have the shutters closed, and a beam of solar light admitted of the size of the illuminating tube; but this is not absolutely essential if precautions be taken to prevent diffused light entering the camera, and the ground glass be shaded while examining the image on its surface.

Position of the instrument.—The camera must be turned at right angles to the source of light, and the tube A, or illuminating tube, turned so that the light will fall full into the tube, and be incident upon the whole of the lens G.

If the camera and tube be now in proper position, a cone of light will issue from the end of the camera tube through the centre of the aperture in the diaphragm, which is the condensed light from the lens G reflected from the plate glass D. This cone forms a focus about ½ inch outside the diaphragm, which can be seen by holding a thin piece of white paper near the diaphragm. If it be a cat or rabbit, that is to be experimented upon, it is well to have it secured in a box of the right size, with the head projecting through an aperture for the purpose.

In photographing the eye of a cat I found it necessary to put it under the influence of chloroform,